

JOURNAL
OF THE
ASIATIC SOCIETY OF BENGAL.



Vol. LXII. Part II.—NATURAL SCIENCE.

No. IV.—1893.

Natural History Notes from H. M. Indian Marine Survey Steamer, 'Investigator,' Commander C. F. Oldham, R. N., Commanding. Series II., No. 9. An Account of the Deep Sea Collection made during the Season of 1892-93.—By A. ALCOCK, M.B., C.M.Z.S., Superintendent of the Indian Museum.

With plates VIII. and IX.

[Recd. Nov. 21. Read Decr. 6th.]

The collection here described is a very small one, but the few things obtained are interesting.

Among Coelenterata, *Cerianthus* and *Cyathohelia* do not appear to have been before recorded from the Bay of Bengal: among Echinoderma, *Astroscema* and *Echinolampas*—although the latter has been recorded as a Sind Tertiary fossil: and among fishes *Odontostomus*. All these occur in the present collection.

COELENTERATA.

NEMATOPHORA.

ANTHOZOA ACTINIOMORPHA.

ACTINIARIA.

Family **Cerianthineæ**.

CERIANTHUS, Delle Chiaje.

1. *Cerianthus tenebrarum*, n. sp.

Elegantly caryophyllaceous in shape.

The body wall is thick, and the characteristic investing sheath is

J. II. 22.

loose. The oral sphincter is stout. The tentacles of the inner crown are short and number about fifty: those of the outer crown are very long with stout base and long wavy filamentous ending, and number about sixty. The septa with their mesenteric filaments are almost entirely confined to the upper third of the enteric cavity, leaving about the lower two-thirds as a perfectly smooth-walled chamber.

Colour dull madder, the tentacles being lighter and ruddier than the body.

Length, contracted in spirit, 50 mm.

With the exception of a species from the Andaman Reefs, described in J. A. S. B., Vol. LXII., Pt. II., 1893, p. 153, this seems to be the only *Cerianthus* hitherto recorded from India.

From the Bay of Bengal on a muddy bottom at 410 fathoms: bottom-temperature 45.5° Fahr.

MADREPORARIA APOROSA.

Family Turbinolidæ.

(1) *Flabellum laciniatum*, Phil., and (2) *Flabellum japonicum*, Moseley, appear to be quite common inhabitants of the muddy bottom of the Bay of Bengal at 400–700 fathoms. And among the corals obtained with them during the past year is a new species of *Rhizotrochus*.

RHIZOTROCHUS, Edw. and Haime.

3. *Rhizotrochus crateriformis*, n. sp., Pl. VIII. figs. 1 and 2.

Corallum low, bowl-shaped, having a small central mamillary pedicular scar, a very thin fragile epithecate wall, and a regular, circular calicular orifice with the lip gently everted.

From the thecal wall, which is marked with close faint costal striæ and with close faint concentric lines of growth, the large cylindrical "rootlets" stand out at a wide angle.

The septa, which are in four complete cycles, with an incomplete fifth, are thin, and have their crests strongly emarginate, so that when the corallum is viewed from above they look something like large pali: their surface is marked with lines of distant, coarse granules, concentric with the curve of the crest. The septa of the first two cycles are approximately co-equal, and all unite at the very bottom of the calice by a few stout cylindrical trabeculæ which form a rudimentary columella: above this they do not encroach very greatly on the calicular space, but leave a clear wide central fossa. The septa of the third cycle are narrow laminae, those of the fourth are still narrower, and those of the incomplete fifth are merely fine ridges in the upper part of the calice.

Colour in spirit—both corallum and soft parts—quite white.

The tentacles, which appear to be about ninety in number, are disposed in three concentric series.

Greatest height 22 mm.: diameter of calicular orifice 32 mm.: depth of calicular fossa 16 mm.

From the Bay of Bengal on a muddy bottom at 573 fathoms: bottom-temperature 45·3° Fahr.

Family **Oculinidæ**.

CYATHOHELIA, Edw. and H.

4. *Cyathohelia axillaris* (Ell. and Sol.)

Madrepora axillaris, Ellis and Solander, Nat. Hist. of Zoophytes, p. 153, tab. 13, fig. 5.

Cyathohelia axillaris, Edw. and Haime, Coralliaires II. 110.

A branch of a colony answering to the figure in Ellis and Solander was dredged from a previously unknown coral bank in Lat. 14° 11' 6" N., Long. 80° 24' E. [about 55 miles N. by E. of Madras) in 88 fathoms, bottom-temperature 65° Fahr.

MADREPORARIA POROSA.

Family **Eupsammidæ**.

DENDROPHYLLIA, Edw. and H.

5. *Dendrophyllia nigrescens*, Dana.

Dendrophyllia nigrescens, Dana, Zoophytes, p. 387, pl. 27 (30), fig. 1.

From the same coral bank, at the same depth, several branches of this species were dredged.

ANTHOZOA ALCYONIOMORPHA.

The coral bank in 88 fathoms, N. by E. of Madras, appears to be very rich in *Gorgonacea* and *Alcyonacea*. Unfortunately the dredgings were merely rough dried, without any treatment, so that they reached the Museum denuded and almost valueless. The following genera are recognized:—*Anthogorgia*, *Echinogorgia*, *Acis*, *Gorgonella*, *Juncella*, *Scirpearrella*; *Spongodes*.

ECHINODERMA.

ASTEROIDEA.

Family **Archasteridæ**.

PSEUDARCHASTER, Sladen.

1. *Pseudarchaster mosaicus*, Alcock and Wood-Mason.

Pseudarchaster mosaicus, Alcock and Wood-Mason, Ann. and Mag. Nat. Hist., Dec. 1891, p. 432.

A specimen with a span of nearly 200 mm. from 599 fathoms off the Madras Coast.

Family **Astropectinidæ.**

DIPSACASTER, gen. nov.

2. *Dipsacaster, pentagonalis*, n. sp.

Differs from *Dipsacaster sladeni* (Ann. Mag. Nat. Hist., February, 1893, p. 87, pl. V. figs 3 and 4) in the following particulars:—The disk is relatively larger, and the rays, which are bluntly rounded at the tip, are relatively shorter and broader—the whole form being thus more pentagonal; the relative length of the rays to the radius of the disk is 2.5: 1; the paxillæ are larger; on the adambulacral plates the central spine of the paxilliform group is a large distinct spine and not a mere spinelet. Two specimens from the Andaman Sea, 112 fathoms.

Family **Pentagonasteridæ.**

CALLIASTER, Gray.

3. *Calliaster mamillifer*, n. sp., Pl. VIII. figs. 3 and 4.

Rays 5 R=2.5 to 3r.

Abactinal area covered with sunken circular plates, each bounded by a ring of discoid granules: the mid-radial plates of the disk bear each a great globular mammillated spinelet, as do also, but on a smaller scale, the dorso-central and basal inter-radial plates.

The supero-marginal plates, which are six in number, excluding the terminal, and come in partial contact across the distal third of the rays, have the form of great globules, each surmounted centrally with a nipple-like spinelet: those in the outer third of the ray sometimes bear also one or two granules.

The infero-marginal plates coincide not quite exactly with their fellows of the supero-marginal series: they are long, broad and tumid, and each bears near the suture line with that series, a row or a group of large coarse truncated spinelets.

The adambulacral plates have each a furrow series of four radiating spinelets, and actually a single large coarse truncated spine and rarely a few granules also.

The actinal inter-radial areas are of some size, with large and slightly tumid plates, many of which have one, or very rarely two, large coarse spinelets.

All the marginal, adambulacral, and actinal plates have much the same fringe of discoid granules or squames as the abactinal plates, only it is not so regular.

Anus subcentral.

Madreporite small, circular, radially striated, situated about midway between the margin and the centre.

Colour in spirit, chalky yellow. This singularly beautiful species was dredged in the Andaman Sea, between 270 and 245 fathoms.

Family **Zoroasteridæ**.

ZOROASTER Wyville Thomson.

Fine specimens of (4.) *Zoroaster Alfredi* and (5.) *Zoroaster barathri* (Ann. Mag. Nat. Hist., Feb. 1893, pp. 102, 103), from the Bay of Bengal, 599 fathoms.

OPHIUROIDEA.

Family **Astrophytidæ**.

ASTROSCHEMA, Örst. and Ltk.

1. *Astroschema flosculus*, n. sp., Pl. VIII. fig. 5.

R=11r-16r.

The sides and abactinal surface of the disk and arms are covered with granules,—prominent granules and globules being scattered over a finely granular surface, and the actinal surface is covered with an uniform microscopic granulation.

Viewed from the aboral aspect the disk is rotate-corolla-shaped, being deeply depressed in the centre and consisting of five deep cut petaloid lobes, each composed of a pair of radial plates. There are no mouth papillæ or tooth papillæ, but there is a vertical row of five large hastate teeth on each mouth segment.

Rays long, tapering to a lash, simple, and perfectly square in section, the actinal angles of the square being occupied by the series of paired spine-like tentacle scales, and the abactinal angles by series of prominent clumps of globular granules corresponding to the tentacle scales, this arrangement emphasizing the arm joints and giving the arms a regularly beaded appearance.

Genital openings nearly vertical, and traversing nearly the whole depth of the disk.

Mouth tentacles large, the second pair of tentacles without any scale, the third pair with the pairs of scales small.

Colour, in alcohol, grey; in life, blood-red.

From the newly discovered coral bank north of Madras, in 88 fathoms.

ECHINOIDEA.

SPATANGOIDA.Family **Cassidulidæ**.

ECHINOLAMPAS, Gray.

1. *Echinolampas castanea*, n. sp., Pl. VIII. fig. 6.

Test thick, high, bluntly conical towards the greatly excentric abruptly subacuminate apical system; sub-pentagonal in tumid ambital outline; densely felted with short capillary spines, which are larger

and sparser on the actinal surface, and at the tumid inter-radial peristomial margins form fan-like tufts.

Ambulacra equal, narrow, petaloid abactinally, the poriferous areas of unequal length in the same petal, approaching as if to close, and then again diverging, the pairs of pores set very close together in grooves separated by moniliform ridges: beyond the petals the ambulacra increase considerably in width to the ambitus, whence they taper to the peristome, while the pores become single, distant, and invisible to the naked eye as far as the vicinity of the peristome, where they are again large and double, and are crowded together to form distinct phyllodes.

Inter-radia large, constricted very abruptly at the apical system and gradually at the peristome, being represented at the peristomial margin by a single tumid granular plate.

Both ambulacral and interradial plates closely covered with small scrobiculate tubercles of uniform size and disposition, except in the middle of the actinal surface, where they become a little larger and much more scattered: fine miliary granulation between the tubercles.

Apical system small, very excentric in front: a large central madreporite extending from the right anterior basal: four genital pores.

Peristome situated in the middle of a distinct hollow, excentric in front, transverse, pentagonal, with a distinct floscelle.

Periproct in posterior inter-radium, large, elliptical, transverse, immediately inframarginal, with a valvular operculum formed of three large tuberculated plates.

Colour, yellowish green.

Bay of Bengal, 11 fathoms.

At first sight this species has a strong resemblance to *Echinolampas spheroidalis*, d'Arch and Haime, from the Miocene of Sind and Kuchl; from which it is distinguished at once by the concavity of the actinal surface and by the tumid peristomial margin. The test is also higher in the present species.

Family Spatangidæ.

BRISSOPSIS, Ag.

2. *Brissoopsis Oldhami*, n. sp., Pl. VIII. figs. 7 and 8.

Test thin, inflated, ovoid, with a faint anterior groove and a strong posterior truncation; abactinally covered with recurved hair-like spines which are largest and densest within the peripetalous fasciole; actinally with similar large spines in the interradial, the ambulacra being almost naked.

All the ambulacra are abactinally petaloid and sunken: in the

anterior petal, which is the longest and narrowest, the pores are small and extremely evenly and closely set, in the other petals the pores are large: beyond the petals the ambulacra are only slightly spiniferous at the ambitus, and are almost or quite naked actinally; and all have small and distant pores; but abactinally the plates of the postero-lateral ambulacra are spiniferous, and the pores of those that are enclosed in the sub-anal fasciole are exceptionally large. Abactinally, as actinally, the inter-radial plates are very large, with big broad plates that are finely and closely granular abactinally and much more coarsely and distantly granular actinally.

Peristome reniform: the orifice of the mouth is made valvular by the remarkable prolongation forwards of the labrum.

Apical system hardly excentric; the madreporite is large, passing backwards from the right anterior basal and separating the posterior basals and radials and several inter-radial plates; four large genital pores.

Periproct small, vertically pyriform, high up in the posterior truncation, with many plates, of which those at the circumference are the largest.

The peripetalous fasciole is very distinct, being broadest posteriorly. Sub-anal fasciole reniform, largely actinal in position, being far distant from the periproct. Two narrow and inconspicuous fasciolar bands extend up from the sub-anal fasciole, one on each side, to the level of the periproct and are then gradually lost.

The pedicels of the anterior petal are of conspicuous length.

Colour, dull olive-green; fascioles dull madder brown.

Bay of Bengal, 753 fathoms, bottom soft mud; bottom temperature 41.2° fahr.

LOVENIA, Ag. and Desor.

3. *Lovenia gregalis*, n. sp., Pl. VIII. fig. 9.

Test thin, broad, flat, cordiform, grooved and deeply excised anteriorly, broadly truncate posteriorly, the ambital margin in front sharp, behind gently rounded. Spinature scanty.

Anterior ambulacrum in the groove, with pores small and inconspicuous except at the peristome, where they are larger: it is practically unmodified throughout its course, from apex to peristome. Lateral petaloid ambulacra with pores almost invisible to the naked eye within the internal fasciole: beyond the internal fasciole the antero-lateral petals are markedly divergent from, while the postero-lateral petals are convergent towards, the sagittal line: the slightly sunken pairs of pores are large and are separated from one another by faint

ridges with minute distant granulation, the interporiferous space is broad and bears several series of granules. Beyond the petals the postero-lateral ambulacra increase greatly, while the antero-lateral decrease somewhat in width.

Inter-radii very large and broad abactinally where the antero-lateral bear each a small patch, and the postero-lateral each a much larger patch, of large deeply scrobiculate perforated tubercles, each surmounted by a long slender recurved recumbent hollow spine. Similar but smaller tubercles, with similar spines, cover the actinal surface rather more densely throughout almost the whole of the broad antero-lateral and postero-lateral inter-radii, and also occur in two small patches, involving both ambulacral and posterior inter-radial plates, in each wing of the sub-anal fasciole.

Peristome situated immediately behind the anterior cleft, semilunar in shape, and followed by a long narrow labrum.

Apical system hardly excentric; the madreporite in the posterior basal.

Periproct in the upper part of the posterior truncation, large, transversely oval, not sunken.

The internal fasciole is remarkable in not crossing the anterior ambulacrum; after skirting the groove in rather more than half of its extent, it gradually fades away on either side, sometimes bending slightly towards the groove, as if to cross, sometimes not. The subanal fasciole is large and dumb-bell shaped, and encloses three pairs of pores on either side.

Colours: brownish green, spines white.

Bay of Bengal, 475 fathoms, bottom brown ooze, bottom temperature 45.5° Fahr.

MOLLUSCA.

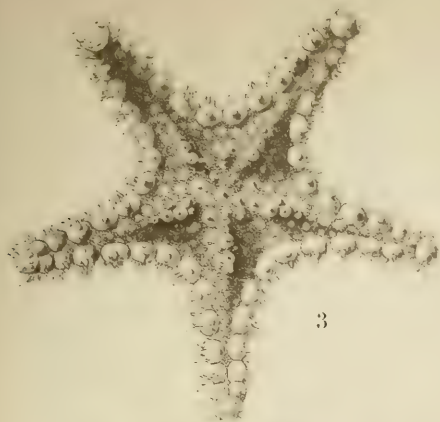
The Mollusca that we may now regard as characteristic of the hundred-fathom line in the Bay, were again met with in considerable numbers, namely, *Rostellaria delicatula*, Nevill, *Sigaretus* sp., *Tellina* sp., and *Nucula* sp. At about the same depth (128 fathoms) there were dredged *Phos* sp., *Pleurotoma* sp. prox. *atractoides*, Watson, and *Tellina* sp. prox. *Murrayi*, E. A. Smith, and on the coral bank, at 88 fathoms, *Murex palmarosæ*, Lmk.

ARTHROPODA.

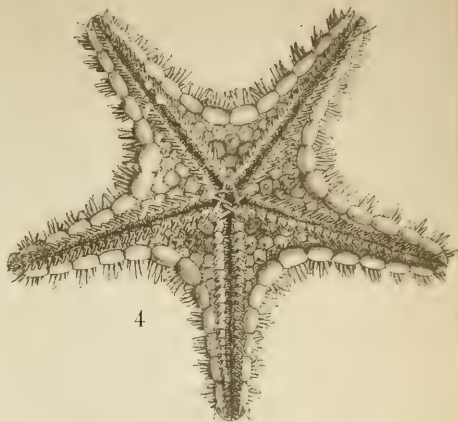
CRUSTACEA.

DECAPODA.

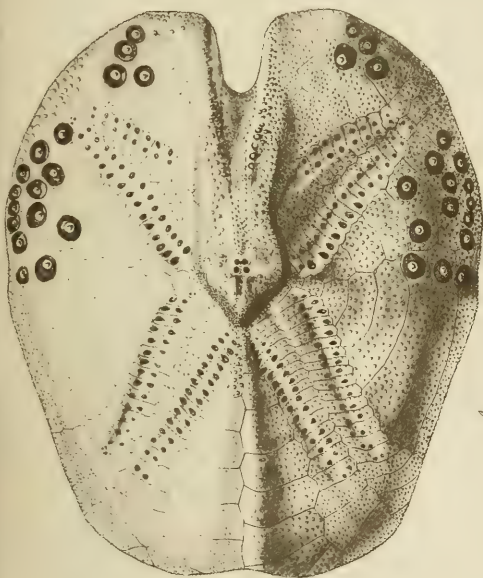
At 128 fathoms the Penæid (1.) *Solenocera Hextii*, Wood-Mason, characteristic of that depth here, was dredged.



3



4



9



7



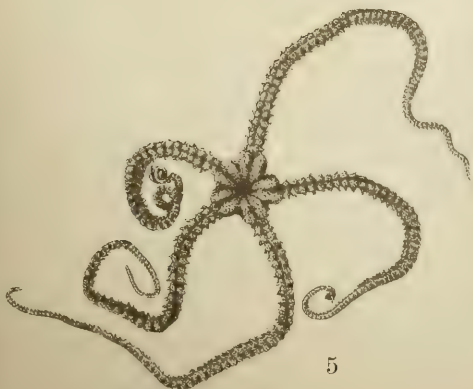
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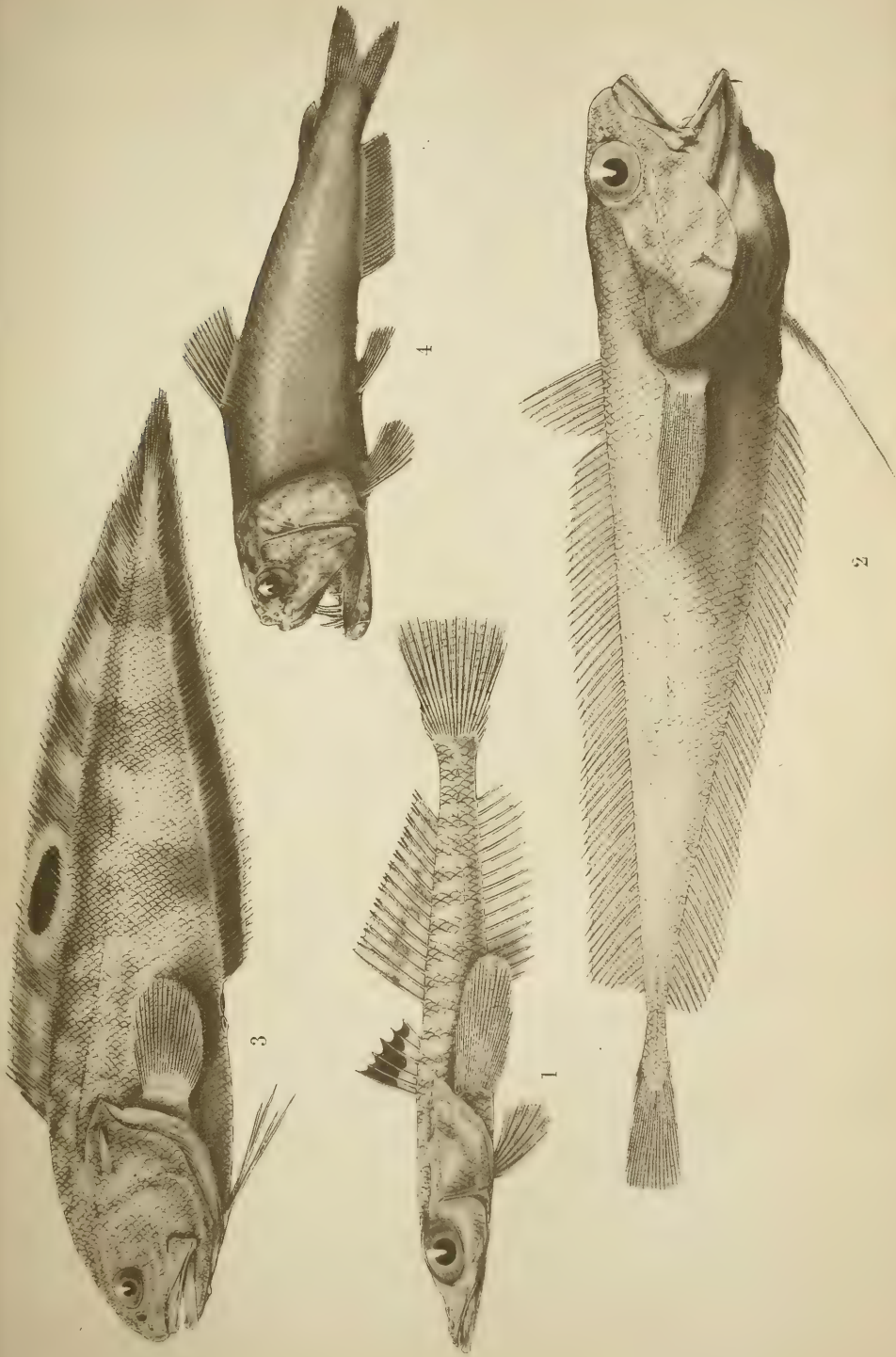
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5



6



INDIAN DEEP-SEA FISHES.

Of the other crustacea taken, three appear to be new to the Indian record. They are as follows:—

Family **Trapeziidæ**.

QUADRELLA, Dana.

2. *Quadrella coronata*, Dana.

Quadrella coronata, Dana, U. S. Expl. Exped., Crust., Pt. I. p. 266, Pl. XVI. figs. 5 a-d.

A single female.

From the Coral Bank north of Madras, 88 fathoms.

Family **Parthenopidæ**.

PARTHENOPE, Fabr.

3. *Parthenope spinosissima*, A. M.-Edw.

Parthenope spinosissima, A.M.-Edw., Notes sur L' Ile de la Réunion Annexe F., p. 8, Pl. XVII;

A large ovigerous female and a small male.

Colour in life reported to be blood-red.

From the Coral Bank north of Madras, 88 fathoms.

Family **Raninidæ**.

RANINOIDES, Milne-Edwards.

4. *Raninoides personatus*, White MS., Henderson.

Raninoides personatus, Henderson, Challenger Anomura, p. 27, Pl. II. fig. 5.

Numerous specimens from the Bay of Bengal, 31 fathoms.

Family **Homolidæ**.

HYP SOPH RYS, Wood-Mason.

5. *Hypsophrys superciliosa*, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p. 269.

Several beautiful specimens, both males and ovigerous females, from the Laccadive Sea, 865 fathoms, bottom *Globigerina* ooze, bottom temperature 40° Fahr.

VERTEBRATA.

PISCES.

ACANTHOPTERYGII.

Family, **Trachinidæ**.

Group *Trachinina*.

BATHYPERCIS, n. gen.

Head large, depressed; body cylindrical, elongate. Cleft of the mouth wide, oblique, with the lower jaw projecting; villiform teeth in

jaws, vomer, and palatines. Eyes large, supero-lateral. Gill-cleft wide; seven branchiostegals; preoperculum armed; four gills; pseudobranchiæ large. Scales ctenoid; lateral line continuous from occiput to caudal fin, its anterior portion armed. Two separate dorsal fins, the first short, the second long, and equal opposite and similar to the anal. Ventrals jugular.

No air-bladder; no pyloric cæca.

1. *Bathypereis platyrhynchus*, n. sp., Pl. IX fig. 1.

General aspect Platycephaloid, with some superficial resemblances to *Callionymus*.

B. 7. D. 6/14. A. 16. C. 12, with numerous rudimentary rays at base. P. circ. 25. V. 1/5. L. lat., from origin on occiput, 50. L. tr., 11.

Head large, broad, depressed, its extreme length, measured from the tip of the projecting mandible to the apex of the prolonged opercular flap is not much less than half the total, caudal excluded. Body elongate, cylindrical, low, and tapering to the large caudal.

The snout is broad, much depressed, and spatulate, resembling the bill of *Bathypterois*; its extreme length is equal to the major diameter of the orbit, and rather over one-fourth the extreme length of the head. Mouth-cleft wide, slightly oblique, the maxilla reaching nearly to the vertical through the middle of the eye, and ending in a fleshy barbel. Teeth in villiform bands on the jaws, vomer, and palatines. Tongue large, spatulate.

The large eyes are placed close together on the summit of the head, separated from each other by a narrow groove; but the visual axis is lateral. The gill-cleft is very wide, the gill-membranes being free of the isthmus throughout: the preopercular angle is spinate, and the operculum, which is prolonged in membrane nearly to the level of the 4th dorsal spine, has two spines above and one below. Four gills with setiform gill-rakers and broad laminae: pseudobranchiæ large.

The body, and the head and the snout above, are covered with rather large finely ctenoid scales. The lateral line, beginning on the occiput as a close-set row of re-curved spines, or strongly carinated scales, curves inwards towards the first dorsal fin and then downwards along the lower half of the tail, being salient but unarmed in this part of its course.

The first dorsal fin is short, and is separated from the second by four or five rows of scales: the second, which is much more elevated than the first, extends from the level of the vent to within an eye-length of the base of the caudal. The anal fin is similar to the second

dorsal. The pectorals are large and long, reaching to the fourth anal ray. The ventrals are jugular, arising an eye-length in advance of the pectorals: their plane of origin is horizontal, and they reach considerably beyond the scaly bases of the pectorals.

Stomach siphonal with a large caecal sack. No pyloric caeca. No air-bladder.

Colours in spirit, yellowish-brown, with thirteen incomplete and indefinite darker cross-bands on body and tail: a golden-green ocellus on crown of head and in the apex of each opercular flap: spinous dorsal white at base, black in the upper half; second dorsal with dusky bands: caudal and pectorals dusky: anal and ventrals hyaline. Length 4·3 inches.

Bay of Bengal, 128 fathoms.

Family, *Pediculati*.

LOPHIUS, Art.

2. *Lophius mutilus*, n. sp.

This species is distinguished from all its fellows by the structure of the second part of the spinous dorsal fin, which is rudimentary.

B. 5. D. 3/ (2)/ 8. A. 5. C. 8. P. 15. V. 1/5.

Cephalic disk enormous, its width nearly equal to its length, which is not much less than half the total, including the caudal.

The head bones are marked by spinate crests, one small and bifid at the pre-orbital angle; one large and tridentate above each orbit; one at the upper limit of the clavicle, one large and trifid at the angle of the clavicle, and two on the preoperculum—besides numerous ridges ending in acute points.

The eyes are large, their major diameter being nearly one-fifth the length of the head.

The mouth-cleft involves the whole breadth of the cephalic disk. Small depressible fangs of unequal size in three irregular series in the mandible, in two series at the pre-maxillary symphysis, but in a single series along the greater extent of the pre-maxilla: a pair of rigid fangs on each side of the vomer: an uneven row of five or six rigid fangs along each palatine. Gill-cleft relatively wide: three gills.

Head and body covered with loose glandular skin, which forms a row of filaments along the edge of the cephalic disk and along the sides of the tail.

Dorsal spines in the form of plain setæ, the first two of which have the usual position close together on the snout, while the third, which is as long as the cephalic disk and nearly twice as long as the second, arises behind the orbit. The second portion of the spinous dorsal is represented by two distant rudimentary rays only visible by

dissection. The soft dorsal, and all the other fins have the usual position.

Colours in spirit, mottled brown, tip of tongue dusky. Length 5.25 inches.

Bay of Bengal, 128 fathoms.

ANACANTHINI.

Family, **Gadidæ.**

PHYSICULUS, Kaup.

3. *Physiculus argyropastus*, n. sp., Pl. IX. fig. 2.

B. 7. D. 8-9/55. A. 57. V. 6.

Head large, broad, depressed, its length a good deal more than one-fourth of the total, caudal included. Height of the compressed body from about half to eleven-nineteenths the length of the head. Snout broad, depressed, rounded, its length equal to the width of the interorbital space and just exceeding the major diameter of the eye. Mouth wide, oblique, with the upper jaw overhanging; the maxilla reaches behind the vertical through the middle of the orbit; broadish bands of villiform teeth in the jaws only. Barbel filiform and inconspicuous, its length not half that of the eye. Gill-openings extremely wide, free from the isthmus throughout: four gills, with about eleven spatulate gill-rakers. Pseudobranchiæ glandular. Body and head invested with small thin deciduous cycloid scales, of which there are six rows between the first dorsal fin and the lateral line.

The first dorsal, which is separated from the second only by a notch, begins in the vertical through the origin of the pectorals; its height is about equal to the length of its base, which is considerably less than one-third that of the head: the second dorsal extends to within an eye-length of the caudal, and its rays, posteriorly especially, are longer than those of the first. The anal begins almost in the vertical through the base of the pectoral, the vent being situated forwards in the vertical through the posterior edge of the operculum. The pectorals are long and pointed, the upper rays reaching to the twelfth or fourteenth anal ray, and being as long as the head behind the middle of the eye. The ventrals arise on narrow horizontal bases: the second ray is nearly as long as the head. There is a post-anal papilla, and a pre-anal pigmented pit, as in *Physiculus roseus*.

The margin of the large thick-walled air-bladder is pectinately lobed somewhat as in *Sciænoids*. Colour in spirit, light pinkish brown, with a silvery sheen; belly, throat, and gill-membranes black.

Bay of Bengal, 128 fathoms.

The largest specimen, an adult female, is 9 inches long.

BREGMACEROS, Thompson.

4. *Bregmaceros MacClellandii*, Thomps.

A fine specimen from the Bay of Bengal in 128 fathoms.

The small and immature specimens dredged in previous years at and near this depth, probably belong to this species.

Family, **Ophidiidæ**.

NEOBYTHITES, Goode and Bean.

5. *Neobythites steatiticus*, n. sp., Pl. IX Fig 3.

B. 8. D. circ. 85. A circ. 65. C. 8. P. circ. 22. V. 2.

The large heavy head is in length about one-fourth of the total, caudal included, and is armed with a large opercular spine. The snout, which is bluntly pointed and overhangs the mouth, is in length equal to the diameter of the eye, or between a fifth and a sixth the length of the head. The eyes are large and prominent, without any orbital fold: they are a little over a diameter apart. The nostrils are large, the anterior being a small tube near the tip of the snout, the posterior being a large foramen at the angle of the eye.

The mouth is large, the maxillary extending far behind the posterior border of the orbit, and being nearly half of the head in length.

Teeth viliform, in narrow bands in the jaws, vomer, and palatines.

Gill-cleft very wide, the gill-membranes being separate throughout. Four gills, with broad laminae and close-set gill-rakers, which are long in the middle of the first arch.

Each pseudobranch consists of two pinnules only. The head, body, and base of the dorsal and pectoral fins are covered with small, moderately adherent scales, of which there are about nine rows between the first dorsal ray and the lateral line, and about twenty-one rows between the lateral line and the vent. The vertical fins have long delicate rays, which are completely invested in loose skin: the dorsal begins well in advance of the base of the pectoral, and the anal on a level with the tip of the latter, both being confluent with the caudal at its base.

Pectorals with large fleshy scaly base: the ventrals arise on the pectoral symphysis, and consist of two long filaments fused together in their basal half.

Stomach siphonal; intestine much coiled; about eight or nine minute rudimentary pyloric caeca encircle the pylorus.

Colour in spirit, creamy yellow clouded and marbled with shades of light brown which forms four ill-defined cross-bands, all of them involving the dorsal fin: a large oval ocellus, formed of a black centre

in a broad creamy white ring, on the dorsal fin between the 20th and 30th rays or a little beyond: anal jet black with a milk-white border.

Length of type 5·25 inches.

Bay of Bengal, 128 fathoms.

PHYSOSTOMI.

Family, **Scopelidæ.**

ODONTOSTOMUS, Cocco.

6. *Odontostomus atratus*, n. sp., Pl. IX Fig. 4.

The extreme length of the square, high, compressed head is a little more, and the greatest height of the compressed tapering body is a little less, than one-fourth of the total, caudal included.

The snout has the form of a pointed wart beyond which the upper jaw projects, the lower jaw again projecting beyond the upper.

The eyes, which are situated about a diameter apart, near the top of the head, have their major diameter obliquely vertical, and are capable of such strong rotation inwards as to bring the visual axis obliquely upwards, the orbit being walled in laterally by a stout but transparent fold of skin in its lower half.

The cleft of the mouth extends almost to the posterior edge of the operculum: the premaxillæ are armed with a series of close uniform serrations for the most part pointing forwards, the vomer bears on each side a sabre-shaped depressible fang nearly half as long as the head, the palatines have each an exactly similar fang succeeded by a row of close serrations, and the mandible has on each side a distant series of similar fangs of unequal size, the largest of them however being hardly half the length of those on the vomer and palatines.

Gill-cleft extremely wide and high: four gills with wide laminae and gill-rakers inconspicuous or absent: pseudobranchiæ large.

Body covered with a glandular scaleless skin in which the lateral line appears in spirit as a white streak. Rows of white dots (luminous organs?) exist along the free border of the preoperculum and the inner border of the broad boat-shaped mandible.

The dorsal fin lies altogether within the anterior half of the body: the anal begins about half a head length behind the vertical through the last dorsal ray, and extends to the rudimentary basal rays of the forked caudal. The large pectorals arise close to the ventral profile, almost in the same plane with the ventrals, the bases of which they touch when laid back. The ventrals arise under the middle of the dorsal.

Colour in spirit, jet black.

Length 3·5 inches.

Bay of Bengal, 573 fathoms.

Family **Muraenidae**.**CONGROMURÆNA**, Kaup.

7. *Congromuræna squaliceps*, n. sp., allied to *C. megastoma*. Gthr. and *C. longicauda*, Alcock.

Head about an eye-length longer than the trunk, which is not quite one-fourth the length of the tail. The snout, which projects far beyond the mouth, is a little more than one-fifth the head in length. The major diameter of the very elliptical eye is not quite two-thirds of the length of the snout. The anterior nostril is a short wide tube situated on the lip near the end of the snout, the posterior is a wide foramen situated in advance of and above the angle of the eye. The mouth-cleft is wide, extending almost to the vertical through the posterior border of the orbit, and the lips are greatly developed: the minute teeth are in bands in the jaws, and in a broad rasp-like patch outside the mouth in the premaxillary; there are a few teeth on the vomer quite anteriorly. Gill-openings comparatively wide, separate. No scales: lateral line with small pores. Pectorals narrow, half an eye-length longer than the snout. Vertical fins confluent, the dorsal beginning nearly an eye-length in advance of the gill-opening.

Colour in spirit, grey, the vertical fins in their after half to two-thirds with a black edge, which in the anal tends to involve the whole fin. A very large air-bladder extending half a head-length beyond the vent. Visceral peritoneum silvery. A sexually mature male 15 inches long from the Bay of Bengal, 128 fathoms.

8. *Congromuræna nasica*, n. sp. Allied to the preceding group.

Head depressed, an eye-length longer than the trunk, which is much more than a-fourth the length of the tail (1 : about 3·4).

The snout, which projects beyond the mouth, is a fourth the length of the head and nearly twice the major diameter of the eye. The nostrils are as in the preceding species.

The mouth cleft extends almost to the vertical through the posterior border of the orbit. The teeth are in two bands in each jaw, an inner band of minute teeth, and an outer broader band of larger teeth: the premaxillary teeth are in bands outside of the closed mouth, and the vomerine teeth are in a single row along the anterior fourth of the bone.

Gill-openings comparatively wide, separate. No scales: lateral line with minute pores. Pectorals narrow, equal to the snout in length. Vertical fins confluent, the dorsal beginning over the gill-opening.

Colour in spirit gray, the vertical fins in their after third to fourth with a much narrower black edge. Visceral peritoneum black.

Two nearly mature females 10 inches long, and two young from the Bay of Bengal, 123 fathoms. The differences between this species and the preceding are too numerous to support the opinion that they are only different sexes of the same species.

At the same station a specimen of (9.) *Dysomma bucephalus* was dredged.

On some Indian Species of Canarium.—By GEORGE KING, M. B., LL. D.,
F.R.S., C.I.E. Superintendent of the Royal Botanic Garden, Calcutta.

With Plates X, XI, XII, and XIII.

[Read — December 6th]

In Sir Joseph Hooker's Flora of British India eighteen species of *Canarium* are described. Of these, twelve are Indo-Malayan, two have hitherto been collected only in the Andaman Islands, and two are confined to Ceylon. The remaining two, viz., *C. strictum*, Roxb., and *C. bengalense*, Roxb. are natives of British India proper, and were both originally published by Roxburgh in his Flora Indica. *C. strictum* is a native of Southern India, and was originally described from specimens received by Roxburgh from the Forests of the Tinnivelli district in the extreme South of the Peninsula. It has since been collected in the Anamalli and Bababudin Hills, in the Concan, and in other parts of the Forests of the Western Ghats. *C. bengalense*, on the other hand, is known only from Sylhet and Assam. The distribution of the two species is therefore very different. All the species of *Canarium* known to me are large trees with tall clear stems, bearing branches, (and consequently flower and fruit), only at their apices. Botanical specimens are therefore not easily obtained, and the various species are poorly represented in most collections, and are therefore but imperfectly understood by Botanists. The species indigenous to British India proper do not in these respects form any exception; for, in spite of the existence for the last five and twenty years of a large and well-organised Forest Department, we do not appear to know more to-day about them than we did when Roxburgh originally described two of them eighty years ago. With the view of directing the attention of forest officers to their study, I venture to submit to the Society descriptions of the two already recognised Indian species, a description of what appears to me to be a new species from Sikkim, and some notes on specimens which appear to belong to two species hitherto unrecognised and undescribed.